

What is claimed is:

1. A polypeptide having pyrimidine glycosylase activity, the polypeptide comprising a targeting sequence.
2. A composition comprising the polynucleotide of claim 1 and a pharmaceutically acceptable carrier.
3. A polypeptide having pyrimidine glycosylase activity, the polypeptide comprising an exogenous targeting sequence.
4. A composition comprising the polynucleotide of claim 3 and a pharmaceutically acceptable carrier.
5. A polypeptide having pyrimidine glycosylase/AP lyase activity, the polypeptide comprising a targeting sequence.
6. A composition comprising the polynucleotide of claim 5 and a pharmaceutically acceptable carrier.
7. A polypeptide having pyrimidine glycosylase/AP lyase activity, the polypeptide comprising an exogenous targeting sequence.
8. A composition comprising the polynucleotide of claim 7 and a pharmaceutically acceptable carrier.
9. A polypeptide comprising:
 - an amino acid sequence selected from the group consisting of SEQ ID NO:41, SEQ ID NO:42, and SEQ ID NO:43; and
 - a targeting sequence.
10. A polypeptide comprising:

an amino acid sequence selected from the group consisting of SEQ ID NO:41, SEQ ID NO:42, and SEQ ID NO:43; and
an exogenous targeting sequence.

11. A polypeptide comprising:

an amino acid sequence having pyrimidine glycosylase/AP lyase activity, the amino acid sequence having at least about 15 % identity with an amino acid sequence selected from the group consisting of SEQ ID NO:41, SEQ ID NO:42, and SEQ ID NO:43; and
a targeting sequence.

12. A polypeptide comprising:

an amino acid sequence having pyrimidine glycosylase /AP lyase activity, the amino acid sequence having at least about 15 % identity with an amino acid sequence selected from the group consisting of SEQ ID NO:41, SEQ ID NO:42, and SEQ ID NO:43; and
an exogenous targeting sequence.

13. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase activity, the polypeptide comprising a targeting sequence.

14. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase activity, the polypeptide comprising an exogenous targeting sequence.

15. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase/AP lyase activity, the polypeptide comprising a targeting sequence.

16. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase/AP lyase activity, the polypeptide comprising an exogenous targeting sequence.

17. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising a targeting sequence, the

polynucleotide comprising a nucleotide sequence selected from the group consisting of SEQ ID NO:44, SEQ ID NO:45, and SEQ ID NO:46.

18. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising an exogenous targeting sequence, the polynucleotide comprising a nucleotide sequence selected from the group consisting of SEQ ID NO:44, SEQ ID NO:45, and SEQ ID NO:46.

19. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising a targeting sequence, the polynucleotide comprising a nucleotide sequence having at least about 10 % identity with a nucleotide sequence selected from the group consisting of SEQ ID NO:44, SEQ ID NO:45, and SEQ ID NO:46.

20. A polynucleotide comprising a coding sequence encoding a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising an exogenous targeting sequence, the polynucleotide comprising a nucleotide sequence sequence having at least about 10 % identity with a nucleotide sequence selected from the group consisting of SEQ ID NO:44, SEQ ID NO:45, and SEQ ID NO:46.

21. A method for increasing the repair rate of damaged bases in a cell, the method comprising introducing to a cell exposed to or at risk of exposure to an agent that damages DNA a composition comprising an amount of a polypeptide effective to increase the repair rate of damaged DNA in the cell compared to a cell that does not comprise the polypeptide, wherein the polypeptide has pyrimidine glycosylase activity and comprises a targeting sequence .

22. A method for increasing the repair rate of damaged bases in a cell, the method comprising introducing to a cell exposed to or at risk of exposure to an agent that damages DNA a composition comprising an amount of a polypeptide effective to increase the repair rate of damaged DNA in the cell compared to a cell that does not comprise the polypeptide, wherein the polypeptide has pyrimidine glycosylase activity and comprises an exogenous targeting sequence.

23. A method for increasing the repair rate of damaged bases in a cell, the method comprising introducing to a cell exposed to or at risk of exposure to an agent that damages DNA a composition comprising an amount of a polypeptide effective to increase the repair rate of damaged DNA in the cell compared to a cell that does not comprise the polypeptide, wherein the polypeptide has pyrimidine glycosylase/AP lyase activity and comprises a targeting sequence .

24. A method for increasing the repair rate of damaged bases in a cell, the method comprising introducing to a cell exposed to or at risk of exposure to an agent that damages DNA a composition comprising an amount of a polypeptide effective to increase the repair rate of damaged DNA in the cell compared to a cell that does not comprise the polypeptide, wherein the polypeptide has pyrimidine glycosylase/AP lyase activity and comprises an exogenous targeting sequence.

25. A method for treating mutagenesis in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising a targeting sequence.

26. A method for treating mutagenesis in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising an exogenous targeting sequence.

27. A method for treating mutagenesis in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising a targeting sequence.

28. A method for treating mutagenesis in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition

comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising an exogenous targeting sequence.

29. A method for treating immunosuppression in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising a targeting sequence.

30. A method for treating immunosuppression in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising an exogenous targeting sequence.

31. A method for treating immunosuppression in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising a targeting sequence.

32. A method for treating immunosuppression in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising an exogenous targeting sequence.

33. A method for treating tumor formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising a targeting sequence.

34. A method for treating tumor formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition

comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising an exogenous targeting sequence.

35. A method for treating tumor formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising a targeting sequence.

36. A method for treating tumor formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising an exogenous targeting sequence.

37. A method for treating apoptotic cell formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising a targeting sequence.

38. A method for treating apoptotic cell formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase activity and comprising an exogenous targeting sequence.

39. A method for treating apoptotic cell formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising a targeting sequence.

40. A method for treating apoptotic cell formation in a subject, the method comprising introducing to a subject exposed to or at risk of exposure to an agent that damages DNA a

composition comprising an effective amount of a polypeptide having pyrimidine glycosylase/AP lyase activity and comprising an exogenous targeting sequence.

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